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## OBSERVATIONS ON THE GOLDEN EAGLE IN MONTANA.

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### *Plates I-IV.*

FROM January to September in 1907, I lived about a mile and a half from the eyrie of the Golden Eagles (*Aquila chrysaetos*) which have nested on Mr. J. H. Price's ranch at Knowlton for seven years. I saw one or other of the splendid birds almost daily, and it was interesting for me to compare their habits with those of the eagles nesting near my ranch in Dawson County of which I have already written a full description.<sup>1</sup> In contradistinction to the latter (which occupied a ledge of rock) these Knowlton eagles have selected a tall pine about half way up a steep hillside, the largest tree in the grove. This hill forms one of a wild pine-clad range facing east and approached across open prairie from that side. It is possible, however, to ride up through timber and rocks behind, and look down into the nest from the hilltop without alarming the eagles. All that takes place therein is plainly visible through powerful binoculars. The Eagles have become so familiarized with the sight of large droves of horses and attendant riders, as to take scarcely any notice of a horseman. On this account many actions can be observed, such as the capture of prey, its conveyance to the nest, and feeding the eaglets, which the more shy badland birds never allowed me to witness. The eyrie, which

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<sup>1</sup> See Auk, Vol. XXII, 1905, pp. 158-167.

consists of an immense pile of pine sticks, rests upon, and is built around, a number of green boughs, while a dead projecting branch near the center forms a convenient perch for the parent eagles. As would naturally be expected in the present case, the vertical height of the nest greatly exceeds the diameter, and its width is much inferior to the nest upon the rock previously described. Nevertheless, as seen from below, it conveys an impression of strength, which is not belied when it is reached, for a six foot man can sit in it with ease. On May 11, the whole external circumference of the nest rim was interwoven with an ornamental binding of green pine tops.

This pair of eagles are of course fully adult, and both have unvaried dark brown tails. The female resembles the male of the Fallon eagles across the Yellowstone and would appear to be a uniform chocolate brown but for a few white scapulars, and some white splashes on the greater wing coverts. The male is similarly flecked with white, but a distinct ferruginous cast overspreads his plumage. As early as February 25, the male eagle was observed to tumble in the air. I first witnessed this remarkable evolution on March 14, 1904, but have observed it several times since. To the best of my knowledge no previous writer has alluded to this habit of the Golden Eagles although it is common to both sexes in the breeding season. It recalls at once the spring tumbling of the male Marsh Hawk (*Circus hudsonius*) which is even more extraordinary from the fact that the hawk turns somersaults in the air. On March 12, 1905, I paid special attention to this display on the part of the male eagle which happened at the time to be sitting on a pine at my Dawson County ranch. Soaring skyward, he suddenly closed his wings, and dropped head-foremost like a spent rocket, until the increasing impetus was checked by spreading them. After his first tumble the eagle shot upwards and repeated it, when he returned to the tree before resuming his aerial performance. The bird employs a somewhat similar manoeuvre, but poised at a lower elevation, for capturing prairie dogs, to which I shall again refer.

At the above mentioned date (Feb. 25) the Knowlton eagles were observed to be patching up their nest, and, while this seemed to give promise of a very early brood, the downy young eventually

appeared about the same time as the badland eaglets. On April 1 the female was sitting on two eggs, and on May 2 the young were hatched out. For birds of their wild shy nature these eagles are wonderfully tame. On April 13, I rode under the branch of a pine in which the male eagle sat, and examined him within a few yards. The bird, which had just begun to moult, remained on his perch preening himself during the whole time that I was there and was still thus engaged when I rode away. The female is more nervous, but, if driven from her eggs, will immediately return to the tree and afterwards settle down on the nest. It is fortunate for the birds that their chosen nesting site is on private property where the owner and all his men take a deep interest in their welfare.

Much has been written in regard to the larder of the eagle during the breeding season, and I have read with great interest and instruction the pamphlet on North American Eagles<sup>1</sup> by Mr. H. C. Oberholser, who gives the following estimate of the probable number of Sharp-tailed Grouse destroyed by Golden Eagles in this State. He writes: "Allowing a pair of eagles to every 100 square miles in Montana, which is probably conservative, there would be 1,450 pairs in the State, and should each one of these pairs kill only one grouse per day for the three months during which eaglets remained in the nest, 130,500 grouse would be destroyed in Montana during this period alone, while it is not to be supposed that at other times the eagles refrain entirely from a diet of game birds. Furthermore, since at this time the grouse themselves have young or eggs, the death of the parent birds means usually the loss of the brood, and this would amount at the lowest calculation to double the number of adults (probably much more) or 261,000 young. Adding to this the adults there results a total of 397,500, a number that is astonishingly large, yet doubtless well within the truth. The destruction of young is of course not as detrimental as that of an equal number of adults, for the young have less chance in the struggle for existence and in the above calculation ample allowance has been made accordingly."

The above is a startling indictment against the royal bird, but

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<sup>1</sup> The North American Eagles and Their Economic Relations. U. S. Department of Agriculture, Bulletin No. 27, pp. 27-28.

its force is greatly weakened by two considerations which give a somewhat different complexion to Mr. Oberholser's results. In the first place it must be remembered that the "balance of Nature" is maintained by relatively few survivors out of the total number born. "Heavy destruction," to use Darwin's classical phrase, "inevitably falls either on the young or on the old during each generation and at recurrent intervals." Birds of prey or epidemic disease are the necessary complement of grouse. In England we have extinguished the birds of prey and our plethoric grouse moors are periodically swept by a pestilence. With all rapidly increasing species, whether of fur, fin or feather, a periodical destructive agency is not only necessary but beneficent. The eagle is replaced by the bacillus.

In the second place, Mr. Oberholser's figures rest on the assumption that all the Montana eagles live on grouse; but this is a mistake, and his estimated eagle grouse-bag may therefore be considerably reduced. As pointed out by Mr. Frank M. Chapman: "A bird's food habits may vary so greatly with locality that it is as deserving of protection in one place as it is unworthy of it in another."<sup>1</sup> All my observations and enquiries show that Golden Eagles invariably feed themselves and their nestlings upon whatever prey is most convenient to their eyrie. Thus many pairs take very few game birds. For example, large prairie dog towns constitute the domain of the Knowlton eagles, and, in striking contrast to my Fallon pair (which never captured a prairie dog), they subsist almost exclusively upon this rodent. Whereas I never visited the badland eyrie without finding one or more Sharp-tailed Grouse, the Knowlton nest, on the other hand (which I examined two or three times a week), always contained one, and occasionally two prairie dogs. Now, the destruction of prairie dogs is of the greatest benefit to the settlers, as in this locality (Knowlton) they have increased to an alarming extent. On some ranches the rodents play havoc with the crops and "dog towns" have encroached upon miles of good grazing land, reducing it to a desert. The burrows also constitute a serious menace to fast riding horsemen. It is only necessary to read the forcible

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<sup>1</sup> Bird Lore, November-December, 1906. p. 213.

paper on 'The Prairie Dog of The Great Plains,'<sup>1</sup> by Dr. C. Hart Merriam, quickly to realize what an unmitigated pest this animal becomes, and how rapidly its towns spread. As quoted therein, Professor W. W. Cooke computes that "32 prairie dogs consume as much grass as one sheep, and 256 prairie dogs as much as one cow." Therefore, whenever eagles, hawks, and owls prey upon these ravagers "they should be protected and encouraged," as recommended in Dr. Merriam's bulletin above mentioned. Only the most energetic measures saved a thirty-acre field of oats belonging to Messrs. Archdale brothers (whose ranch joins that of Mr. Price) from being destroyed by prairie dogs. Despite the liberal use of bisulphide of carbon inside the burrows, combined with frequent shooting of the animals outside, the total estimated summer kill was about 1200 — a number not quite double that credited to the Golden Eagles during the nesting season alone.<sup>2</sup> A hungry eagle will eat two prairie dogs for a meal, but allowance must be made for the fact that females during incubation consume half of what they require at other times. Relying both on what I have myself seen at the eyrie, and upon the observations of others, I have compiled the following statistics.

Throughout the month of April, and for two days in May, allowing an average of three prairie dogs per diem, we get a total of 96 prairie dogs up to the time that the eaglets are hatched. Subsequently, until the young birds forage for themselves (about Aug. 1), if we allow only six of the rodents a day, the total is obtained of 540 prairie dogs for seventy-four days sustenance of four eagles. Thus we have a grand total of 636 prairie dogs during four months for one pair of eagles, which is probably well within the mark.<sup>3</sup> An eagle intent on capturing a prairie dog floats leisurely above the 'town' at a medium height on motionless wings. Preliminary inspection of the hunting-ground is accomplished in wide circles or long sweeps, perhaps two or three miles each way, so as not unduly to alarm the game. Passing over at long intervals, the

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<sup>1</sup> Yearbook U. S. Dept. of Agriculture, 1901, pp. 257-270.

<sup>2</sup> Besides those suffocated, large numbers of prairie dogs were driven by the bisulphide fumes to migrate, and were observed on their travels by Messrs. Archdale.

<sup>3</sup> In an interesting article on the Golden Eagle, Mr. William L. Finley estimates that the family of California Eagles observed by him consumed 540 ground squirrels in three months. (Condor, Vol. VIII, 1906, p. 10.)

bird scans the dog town and judges of the prospect for a successful stoop. The 'dogs' are of course immediately on the alert, but can only see their enemy for a short time on account of the high surrounding pine hills, and, indeed, most 'dog towns' are too extensive for the denizens at one end to notice an eagle passing over at the other. Moreover, an unsuccessful eagle will keep on the wing for several hours, and it is almost certain that the hungry prairie dogs will relax their vigilance at last. When the eagle considers that a favorable chance has arrived it sinks lower, so as to bring the distance between itself and the animals to something like seventy-five or a hundred yards. Should the latter still remain above ground, the royal bird suddenly folds its wings, and, with meteoric rush, falls head first towards the astounded prairie dogs. These scamper for their holes, but about three yards from the ground the eagle spreads its wings and, swiftly following the intended victim, darts out a cruel foot to grasp it. If the attack fails, as sometimes happens, the eagle mounts in a slow, reluctant manner which plainly reveals its disappointment. On May 3 Mr. M. M. Archdale (on a sulky plough behind three horses) drove within a hundred yards of the male eagle when it stooped for, and just missed a prairie dog in the manner above described. His minute observations corroborate mine from a far greater distance. On a different day two other observers saw the same bird successfully seize a prairie dog, but drop it after rising to a considerable height. The eagle made no effort to recover its booty, and such behavior is rather difficult to explain. I suggest that as a prairie dog is carried in one foot the quarry, in its death agony, may have severely bitten the bird's free leg incautiously advanced.

My brother, Mr. Allan Gordon Cameron, who has had considerable experience of Golden Eagles in Argyllshire, believes that they distinctly prefer furred to feathered game. Their favorite food is the Mountain Hare (*Lepus variabilis*), and a dead cat is a sure draw to a trap, if eagles are in the neighborhood. When hares are scarce, or entirely absent, as in the Island of Jura (Inner Hebrides) eagles take rabbits, if accessible, and failing rabbits, perforce prey on grouse, with the devastating results above mentioned by Mr. Oberholser. These results in Jura, however, were due to the grouse leaving the ground in panic, rather than to their

actual destruction by the eagles. During the deer-stalking season, in autumn, eagles find a supplementary food supply in the offal of deer. For a long time in Scotland it was thought doubtful if the Golden Eagle ever struck at flying birds, but Mr. Seton P. Gordon has conclusively shown that it does so with the wing, and that many grouse and ptarmigan are thus dashed to the ground.<sup>1</sup>

To come back to Montana: during the winter of 1906-'07 the Knowlton eagles fed almost entirely on carrion, and three of these birds were regular evening visitors to some cattle carcasses in the willows and box elders along the creek where I lived. A collie used to slink away to this place at sunset, whose disappointed barking often signalled the presence of the royal birds, which kept him at a respectful distance. It was the dog which first brought this habit of the eagles to my notice, as, hearing him bark, I went to find out if a wolf (*Canis lupus* var. *occidentalis*) or other wild animal was guarding the carrion.

The winter of 1906-'07 was the most severe in my eighteen years' Montana experience. For two months the snow lay a foot deep and upwards on the level, and the eagles doubtless found it a difficult matter to obtain sustenance. The Sharp-tailed Grouse and jack-rabbits burrowed into the drifts, and during part of the period the frozen cattle carcasses were proof against the eagles' bills. At Knowlton, on January 14, the thermometer registered  $-34^{\circ}$  at 9 A. M., and all day the spirit never rose above  $-16^{\circ}$ , while on January 15, the temperature varied between  $-12^{\circ}$  at 9 A. M. and  $-16^{\circ}$  at 6 P. M. The famished eagles were compelled to unusual effort, and Mr. R. L. Anderson (who has a ranch in this locality) most kindly sent me a full account of the following remarkable incident. In the middle of January, he was riding two miles below his ranch on the south fork of Cottonwood Creek and suddenly came close upon three Golden Eagles which were devouring an adult buck antelope (*Antilocapra americana*) in a little draw.

Upon his appearance the eagles endeavored to take wing, but all found great difficulty in doing so, "and hopped and fluttered along on the snow for a considerable distance before being able to rise." Despite the bitterly cold weather, the antelope was warm

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<sup>1</sup> Country Life, Jan. 27, 1906.

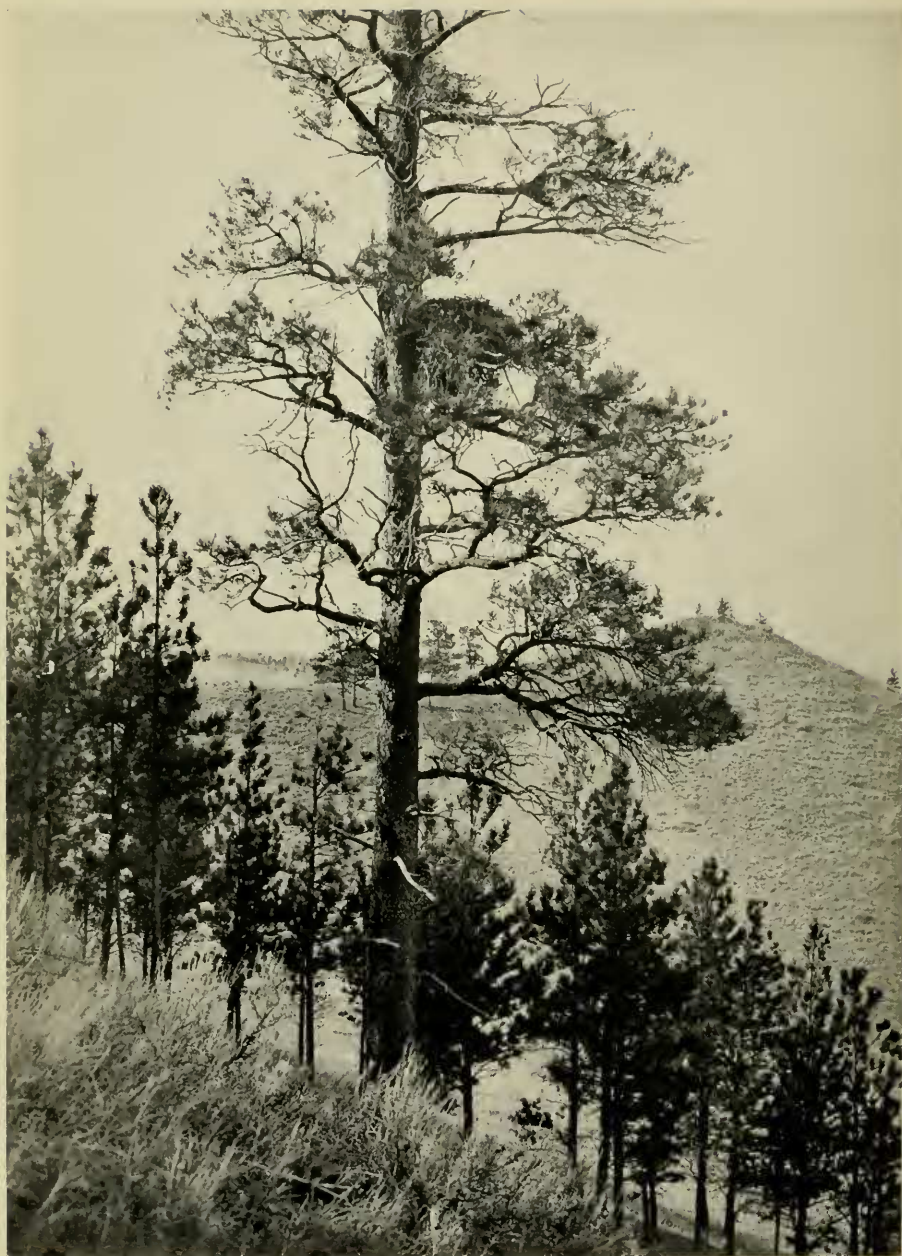
and limber when found, as it had only been quite recently killed. The eagles had torn a large hole in its back with their terrible talons, and were feeding on the kidneys and entrails. Mr. Anderson at once investigated the scene of the struggle and could easily read the gruesome details on the deep, crusted snow. The eagles had obviously stampeded a bunch of antelope, and then cut out a victim by a combined attack. Leaving the herd, the latter endeavored to escape down a small right hand draw, but after covering about a hundred yards was beaten back by the eagles. It then crossed a ridge on which the main antelope trail ran at right angles to its own and, hard pressed by its assailants, struggled down a narrow left hand draw to the place where it succumbed. Altogether the antelope could barely have covered three hundred yards after the first attack by the eagles. The victim, which had evidently offered a gallant resistance, seems to have made a stand in three places, chiefly where found, but also at points along the trail. The crimson stained snow and thickly strewn hair, added to the well defined wing prints of the flapping and dragging eagles, sufficiently revealed this prairie tragedy. One or more of the birds must have clung tenaciously to their quarry's back and from the deep wounds thus inflicted "the blood had spurted out as when a cow's horns are sawn off."

R. R. Brown (the wolfer at Knowlton) informs me that he has often found coyotes in his traps which were partially devoured by eagles. Presumably the coyotes were much debilitated before the eagles attacked them. It is erroneous to suppose that the eagle is "not affected by poisoned bait." Every Montana wolfer has killed eagles in winter with strychnine put out for wolves, and I have myself seen dead birds which had perished from this cause. To quote the late Mr. Howard Saunders, "poison has been a very important cause of the approaching extinction of the Golden Eagle in Ireland."<sup>1</sup> On April 22, the two brothers Archdale saw the male eagle attempt to secure a victim from a north-bound flock of Canada Geese. At sight of the great black bird, which rapidly overtook them, the panic-stricken geese scattered in wild confusion from their usual V-shaped formation, and each member

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<sup>1</sup> *Ibis*, Vol. V, 1905, p. 481.





EAGLE EYRIE, KNOWLTON, MONTANA.





GOLDEN EAGLE IN PINE TREE LOOKING DOWN AT PHOTOGRAPHER.





YOUNG GOLDEN EAGLES, ABOUT TWO MONTHS OLD.

of the flock mounted separately until a mere speck. Meanwhile the eagle endeavored to rise above one of them, but, finding this impossible, he relinquished the chase and flew slowly southwards in the direction of the eyrie. When their enemy was out of sight the geese again resumed a V-shaped formation and continued their interrupted course. The failure of the noble bird on this occasion arose from the fact that he was moulting, and only acute stress of hunger could have induced him to attack the geese. According to my observations the male eagle began to moult on April 13, as above mentioned, and had renewed his plumage by May 1. The female moulted two months later (in the middle of June), and had finished moulting by June 26, when the young were almost ready to leave the nest. Her plumes could be picked up under the tree. I have known a male eagle to shed four primary quills in one day, and it will readily be seen what a serious handicap is here imposed upon his flying powers. It may be supposed that had the eagle succeeded in mounting above the goose, he would have endeavored to bind to this large quarry after the manner of a falcon. Mr. Oberholser, writing of the Bald Eagle (*Haliaeetus leucocephalus*) attacking Canada Geese (*op. cit.*, 11), quotes Mr. William Brewster as follows: "When close upon its quarry the Eagle suddenly sweeps beneath it, and turning back downwards, thrusts its powerful talons up into its breast."

Shortly after his pursuit of the geese the eagle arrived at the eyrie (where I sat on my horse watching) with a prairie dog for his sitting mate. This she declined, when he took the prey to the ground and ravenously ate it himself, tearing it in pieces with the greatest ease. A prairie dog has a very tough hide, and a Goshawk which I had at this time could make nothing of one unless an incision was first made with a knife. An eagle usually places a prairie dog on its back, gradually devours all the edible portion, beginning near the root of the tail, and finishes by leaving a clean skin with the head, feet, and tail on.

The domestic life of the Knowlton eagles was not different in any important particular from that of the badland birds which I have already described. The male did not share the duties of

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<sup>1</sup> Bull. Nutt. Ornith. Club, V, 1880, pp. 57, 58.

incubation, but assisted his partner to shelter the eaglets both from the high winds and hot sun. If the shading hen bird happened to observe me on the hilltop she would immediately squat flat in the nest and imagine herself hidden. This habit was common to both female eagles; their perplexed offspring vainly endeavored to arouse them to a sense of their neglect as long as I remained near. No attempt in the present case was made to secure photographs of the downy white nestlings, as we already had a number, showing them in every stage of plumage from two days old,<sup>1</sup> and we preferred to wait for the eaglets to leave the nest. Although smaller than their badland congeners the Knowlton birds developed sooner, and had entirely lost the fluffy white crop and chin at a month and 26 days old. This suggests the hypothesis that, while a diet of grouse and hares makes the largest eagles, on the other hand, birds fed exclusively on prairie dogs and snakes mature more quickly.

I was unable to verify from personal observation that adult eagles, at least, devour rattlesnakes entire, including the head. Although Sharp-tailed Grouse (*Pediæcetes phasianellus campestris*) and Sage Grouse (*Centrocercus urophasianus*) were common in the neighborhood, I only once saw a bird, or the remains of one, in or near the nest. This solitary exception was on June 26, when from the hilltop at 6 P. M. my wife and I (unnoticed) watched the female eagle entirely pluck and dismember a Sharp-tailed Grouse for her eaglets. The eagle, with her back to us, held the grouse firmly down, by planting a foot at each end, on the now perfectly flat nest. After first pulling out the wing quills, she next attacked the soft clinging body feathers, and got rid of those which adhered to her bill by violently shaking her head. The apparently full-grown eaglets waited patiently one on each side of her, until their supper was ready, and at this point the old bird perceived us and flew away. The eaglets seemed half inclined to follow her example but did not leave the branches. Next morning we were early on the ground with a camera and an ascent of the tree was attempted. Before the eyrie could be reached, however, the female eaglet flew strongly for upwards of a quarter of a mile and settled on the oppo-

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<sup>1</sup> See Auk, Vol. XXII, No. 2.

site hillside. My wife immediately walked to the spot and succeeded in catching her by a wing after the eaglet had made several abortive efforts to rise in the calm air. The male also flapped out of the eyrie and landed bouyantly on the prairie but was captured without trouble. Both eaglets were brought back to their nesting tree; they showed no fight, but clung tenaciously with their talons to whatever they could seize, according to the unfailing custom of young eagles, hawks and owls. As was the case in my former experience, there appeared to be a week's difference in age between the eaglets although hatched at the same time.

We have always found difficulty in photographing full-fledged eaglets, a quick exposure in the sun being necessary, and the subjects persistently flap into the shade. If forced to stay in the sun they turn their backs upon it, and thus belie the poetic fancy of "An eagle mewing her mighty youth, and kindling her undazzled eyes at the full midday beam."<sup>1</sup> Although the old birds endure heat better than their offspring, they collapse panting, with wide open mouths and drooping wings, at 100° in the shade. Eagles then present an undignified appearance much at variance with their ordinary noble aspect. The tendency of the eaglets to droop their wings is apparent in all the photographs; in one view (of the rock) the male has quite assumed the absurd pose of the overheated eagle.

After photographing the eaglets we wasted much time and labor in attempting to restore them to the higher branches. As soon as we replaced them, they flew down again, preferring to sit about on fallen pines until their perfected wings should emancipate them, forever, from their surroundings. At this stage we saw little of them, owing to the difficulty of finding them amidst the rocks and forest debris of these wooded glens, but I ascertained that the parents continued to watch over, and to feed them on prairie dogs for another month. It is possible that the old birds attended to their offspring after this time, but the fact remains that during August, when the eaglets were constantly observed on rocks or pines about the ranch, the parents were never seen with them. Whether sitting inactive, or on the wing, the youngsters always

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<sup>1</sup> Milton. Tractate of Education.

kept up a harsh whistle which was, undoubtedly, a lament for their absent relatives. Once, when one of them lost the other, it screamed incessantly from a lofty scoriaceous rock until its companion returned. Its cries were audible for half a mile, and attracted my wife's attention within the house. In this particular the young birds differ greatly from more matured eagles which are almost invariably silent and utter no sound even when caught in a wolf trap. On September 6, I watched the eaglets hunting for themselves, and to all appearance they flew quite as strongly as the adult birds. Hence we may infer that an eagle takes three months to acquire its full, and almost unrivalled aerial power.

Mr. Oberholser in his bulletin above mentioned states that "The eagle probably seldom, if ever, carries a weight of more than 10 or at the most 12 lbs." Between these two lies the average weight of the bird itself, and some English writers have recently assumed that the eagle can lift and carry off its own weight in prey or even more. Having been able to devote much time to a study of the habits of two pair of eagles (sixty miles apart), which nested close to a ranch where I lived, I feel convinced that the carrying power of the Golden Eagle is limited to a weight of eight pounds at the very most. To supplement my own experience I wrote, in the first instance, to Mr. James Inglis, for 30 years head keeper to the late Duke of Sutherland, who has probably seen as much of eagles in the Scottish Highlands as anyone now living, and subsequently to my brother, who has resided in north Argyll for 23 years, and enjoyed ample opportunities for the study of wild life in a wild district, where eagles breed annually. The experience of both these observers on the point at issue concurred with my own. They report that no authentic record exists in their experience of a Golden Eagle ever carrying a heavier quarry than a mountain hare (*Lepus variabilis*), whose average weight is from 4 to 6 lbs., or a very young hill lamb of the same, and even less weight. Mr. Inglis also writes: "To give some idea what absurd stories are told about eagles: last year a story went the round of the northern newspapers that an eagle carried away a young child at Bonar Bridge. When this was probed to the bottom it was found that two boys invented the tale and sent it to the 'Northern Chronicle' for fun." Mr. R. L. Anderson informs me that a Golden Eagle